

months, and are rare in December, January, and February, and in July and August. A considerable variation in the yearly number is also apparent, the extremes being 14 in 1902 and 21 in 1908. Dividing the total duration, 305 days, by the total number, 118, gives the average duration 2.6 days. It is the popular impression that these winds always last 3 days; but, though the average length just found might tend to confirm this belief, the records in detail show its inaccuracy. For instance, in Table 1 we find 25 northerers lasting only 1 day, 40 of 2 days' duration, 27 of 3 days', 17 of 4 days', and 9 of more than 4 days'. Table 3 gives for each month the maximum wind velocity and direction occurring during the prevalence of a norther. The highest velocity during this period was 45 miles from the northwest in May, 1902, Though known as "northerers" these winds are more frequently and characteristically from the northwest.

TABLE 1.—Duration of northerers (in days).

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual duration.
1902...	2	0	2, 4	1, 3	4, 2	4, 2	0	1	3, 2, 4	1	1	0	33
1903...	0	4, 3	2	3, 3, 2	4, 4, 2	3, 1	3, 1	1	3, 2	2	0	0	44
1904...	3	0	3	5, 2	5, 2, 1	3, 2, 3	1	2	4	4	0	0	46
1905...	0	1	2, 3	2, 1	1, 1, 3	0	6	0	2, 2, 5, 1, 2, 2	4, 2	4, 3	4, 7	47
1906...	1	0	2	2, 5	1	3, 3	0	0	2, 2, 5, 1, 10	4, 3, 2, 2	0	0	46
1907...	0	2	2	4, 1	2, 1, 5	4	0	0	1	4, 5, 2, 2, 1	0	0	38
1908...	0	2	3, 2, 3	3, 3, 1	2, 4, 1	1, 2, 3	0	3	4	2, 3, 2	0	0	51
Duration.	6	12	28	42	52	34	11	9	32	44	28	7	305

TABLE 2.—Number of northerers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1902...	1	0	2	2	1	2	0	1	3	1	1	0	14
1903...	0	2	1	2	3	2	2	1	3	1	0	0	18
1904...	1	0	1	2	5	3	1	1	1	1	0	0	16
1905...	0	1	2	2	3	0	1	0	2	4	2	2	19
1906...	1	0	1	1	1	2	0	0	2	3	4	0	15
1907...	0	1	3	5	4	1	0	1	1	1	4	0	15
1908...	0	1	3	5	3	3	0	1	1	3	4	0	21
Sums.	3	5	11	17	20	13	4	5	13	14	11	2	118

TABLE 3.—Maximum wind velocity and direction of northerers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1902.	33 N.	0	28 NW.	23 NW.	45 NW.	28 NW.	0	18 NW.	32 NW.	24 NW.	15 NW.	0	45 NW.
1903.	0	40 NW.	15 NW.	35 NW.	40 NW.	15 NW.	40 NW.	15 NW.	40 NW.	24 N.	0	0	40 NW.
1904.	18 N.	0	15 NW.	22 NW.	36 NW.	30 NW.	15 NW.	15 NW.	16 NW.	24 NW.	0	0	36 NW.
1905.	0	16 N.	20 NW.	30 NW.	36 NW.	0	15 NW.	0	20 NW.	38 NW.	40 N.	27	38 NW.
1906.	29 NW.	0	16 N.	35 NW.	15 NW.	16 NW.	0	0	22 NW.	33 NW.	36 N.	0	36 NW.
1907.	0	20 NW.	15 NW.	31 NW.	25 NW.	16 NW.	0	19 NW.	15 NW.	29 NW.	28 NW.	0	31 NW.
1908.	0	26 NW.	33 NW.	36 NW.	39 NW.	22 NW.	0	28 NW.	24 NW.	34 NW.	0	0	36 NW.

The desiccating effect of these winds on soil and vegetation is marked; the soil quickly bakes and cracks, vegetation refuses to grow, lawns and alfalfa fields droop and wilt. Disagreeable and depressing effects are felt by man also; the skin becomes dry, sensitive persons have headaches, and all are cross and irritable. It is said that in the early days of rough

and ready justice in California, if murder or violence resulted from a quarrel occurring during a norther, the fact that the north wind was blowing was taken into consideration as an extenuating circumstance! The air at these times is always said to be "full of electricity," and, as was suggested by the investigations made in connection with the foehn, the excess of positive electrons in the lower air may account for some of the disagreeable physical effects of these northerers.

These dry and descending winds, cool at night and hot by day, were observed in 1871 and 1872, and in fact occurring as predicted in the early California forecasts. The explanation then given agreed with that of Mr. Thomas A. Blair, adding only that the high area did not always appear first over the north Pacific coast, but more often formed over the mountains of Oregon and Canada and moved southward, spreading westward a little but mostly to the eastward. Several of the great areas of high pressure studied by Prof. Thomas Russell showed this overflow westward down into the valleys of the San Joaquin and Sacramento. The table given by Mr. Blair is exceedingly instructive and opportune.—C. A.

THE FORCE OF GRAVITY AT THE EARTH'S SURFACE.

We have often called attention to the importance of properly appreciating the influence on the atmosphere of any variations in the force of gravity. The subject is now almost definitely set at rest by the researches of Prof. Dr. O. Hecker, of the Prussian Geodetic Institute. In his memoir of 1908 Doctor Hecker states that the most important result of his latest measurements on the ocean is—

That the force of gravity is normal over the Indian as well as over the Pacific Ocean and corresponds to the gravitation formula published by Helmert in 1901. Therefore, for both of these oceans, as well as for the Atlantic, Pratt's hypothesis as to the isostatic location of the masses that form the earth's crust is proven to be correct, so that we can now call it a general law, except for local anomalies. Hence, it can be considered as proven that the smaller density of the water of the ocean is compensated by the greater density of the crust forming the ocean bed. Inversely the continental masses, rising above the surface of the ocean, are not true accumulations of masses upon the earth's crust, but the apparent excessive mass is compensated by a deficiency of mass below the continents.—C. A.

METEOROLOGY AT HARVARD COLLEGE OBSERVATORY.

The Astronomical Observatory at Harvard College has carried out several special researches bearing on meteorology in addition to the extensive meteorological work which it has conducted in South America. Especially are we indebted to it for studies into the transparency of the atmosphere from an astronomical point of view. In its Annals, Vol. LXI, part 1, Cambridge, 1908, Prof. W. H. Pickering (the brother of the Director, Prof. E. C. Pickering) summarizes the work recently done by the Boyden department, the expenses of which are defrayed from the fund left by Mr. Boyden.

The late Uriah A. Boyden left \$230,000 in trust to aid in the establishment and maintenance of an astronomical observatory on some mountain peak so as to be as free as possible from atmospheric influences. In the search for favorable localities Mr. Pickering says:

It is well known that the deserts of the world lie in two bands, one on either side of the Torrid Zone. They extend in general between 20° and 35° north and south latitudes. These bands nearly coincide also with the regions of calm and of high barometer. As might be inferred from these facts they are also the regions of greatest freedom from cloud. The earth, indeed, according to Leon T. de Bort, (Annales du Bureau Central Météorologique de France, 1884,) as seen from without, must present the appearance of a belted planet, although not so markedly so as Jupiter. The terrestrial belts, however, have this peculiarity, that they move north and south with the sun, but are always a little behind it. Accordingly in tropical countries the rains do not begin until after the sun has crossed the latitude of the place, after which they last for several weeks. Also, as we leave the equator the two rainy seasons approach one another, coinciding near the Tropics.